Skateboard Park Simulation

Relevant parts to the simulation located on the right hand bar:

1. **Potential Energy Reference** - Toggle and place the line at the lowest point of the skateboard path. You move the line by clicking on it dragging it. This point represents zero potential energy since the path of the skateboard can go no lower in this configuration. Conversely the highest Potential Energy would be the highest point of the skateboard path. The PE = 0 line or lowest potential energy is important to establish for the other graphs to follow.
2. **Show Grid** – Toggle. This allows you to see relative movement distances on the skateboarders path
3. **Bar Chart** – Toggle. This is one of the most informative tools with the simulation. When the PE = 0 line is properly placed at the bottom of the track the bar chart shows the changing ratio of potential energy (PE) to Kinetic energy (KE) as the skateboarder moves along the skateboard track. Note that the total energy remains constant and the amount of PE to KE changes with respect to each other but always equals the total energy. This is the heart of the lesson.
4. **Energy vs**. **Position** – This is another way to show the relationship of PE to KE but may not be as clear to students but does present an alternative view.
5. **Energy vs**. Time – Presents the Energy vs. Position graph over time which allows you to compare changes if the skateboarder or other factors are changed such as the friction bar or Location bar. This graph is useful since it is the only non-instantaneous graph available and allows comparison.
6. **Location** - The location bar changes the amount of gravity the skateboarder “feels” on the track. In low gravity situations the skateboarder will often soar off the end of the track since gravity will not pull the skateboarder back down. This adjustment slider or preset can be used to show the impact gravity has on PE and KE energy, i.e., no gravity no PE.
7. **Track Friction** – This adjustment can be too complex a discussion for 9th grade ICP. Rather a general discussion can be made that s friction increases the amount of KE is converted to heat which lowers the speed the skateboarder can use on his next ascent. The sliding scale can be used to demonstrate the affect of increasing friction. Students can relate to rusty whelks or a stuck wheel on the skateboard. Recommend in-depth discussion of Coefficients of Friction to Physics.

For the activities the students need to complete with the simulation I suggest they:

* Build a short track
* Observe the relationship of PE to KE. Describe in words to their teacher their observation.
* Modify variables such as change the skateboarder and observe the relationship between PE to KE. Describe in words to their teacher their observation.
* Change the Gravity and compare to their last skateboarder. Describe in words to their teacher their observation.
* List what factors affect the skateboarder’s ability to rise higher on the track.